Biographical Encyclopedia of Astronomers

Nunes, Pedro

Born Alcácer do Sal, Portugal, 1502

Died Coimbra, Portugal, 11 August 1578

Pedro Nunes is chiefly known for his theoretical work on celestial navigation and his Portuguese translations of works by John of Holywood (Sacrobosco) and Ptolemy. Nunes was the son of Jewish parents who converted to Christianity. During his youth, Portugal was a leader in voyages of exploration and discovery; in the year of Nunes's birth, Vasco da Gama undertook his second voyage to India, and Brazil had already been discovered two years earlier. In 1517, Nunes began his university studies in humanities, philosophy, and medicine at the University of Lisbon, and by 1521/1522, he had gone to Salamanca to study at the university there. In Salamanca, Nunes married Dona Guiomar Aires in 1523, and they had six children (two boys and four girls).

Nunes returned to Portugal in 1524/1525, and on November 16, he was named cosmographer of the kingdom. At that time, he was a Doctor of Medicine. Nunes's nomination was due to his extensive knowledge of astronomy; the course of medicine included studies of mathematics and astronomy, required for the practice of astrological medicine

At the University of Lisbon, Nunes was in charge of lecturing on the subjects of moral philosophy, logic, and metaphysics. In 1532, he went to Évora as tutor of the Infants D. Luís and D. Henrique, future cardinal and king of Portugal. Another pupil was D. João de Castro, who would become one of the greatest Portuguese navigator-pilots and was the future Viceroy of India. On 16 October 1544, Nunes was named lecturer of mathematics at the University of Coimbra, where he had been transferred from Lisbon in 1537. He lectured on that subject until his 25th anniversary in 1562

On 22 December 1547, Nunes was named First Cosmographer of the kingdom. He became so famous that in the year before his death, he was consulted by Pope Gregory XIII about his project of calendar reform. Some studies about Pedro Nunes state that he had been Christoph Clavius's professor when the latter attended classes at the College of Arts at Coimbra in 1556/1557, but such information is erroneous

Nunes's work is vast, not just limited to mathematics and the nautical sciences; he also wrote poetry. Nunes was considered the greatest Portuguese navigator of the Renaissance, and yet he did not set foot overseas. His fame was due to his scientific work, mainly nautical. His concerns about the practical workability of knowledge showed a preponderance of the utilitarian mind over the speculative one. To him, "science" had its sphere of action limited to the "certain and true" things. This practical aspect is seen in the style Nunes used to write out his texts and notes, endowed with great clarity and rigor concerning the presentation of rules and the demonstration of theorems.

Nunes's work can be divided into two major groups: The first is translations and annotations, the second, original works

Nunes's *Tratado da Sphera com a Theorica do Sol e da Lua* and the *1º Livro da Geografia de Ptolomeu Alexandrino* include the annotated translations of three works. The *Tratado da Sphera* is the translation of the book by Sacrobosco with his own notes attached; the *Theorica do Sol e da Lua* comprises the translation of the first three subjects of Georg Peurbach's *Theoricas dos Planetas*, with 17 added notes of his own. The third translated work is the first book of geography by Ptolemy, also with notes by Nunes

After some questions posed by the Portuguese navigator Martim Afonso about the direction and course line of a ship at sea, Nunes was the first to develop the theory of loxodromics, demonstrating that the line drawn by a ship at the sea's surface, when it intersects all the meridians at the same oblique angle, is not a great circle, as they used to think, but a spherical spiral that rounds the Earth's poles an infinite number of times. He also demonstrated that the only circular course lines are the meridians and the parallels that equal the angles of the course of 0 and 90°. Consequently, he wrote *Tratado sobre certas duvidas da navegação que Martim Afonso propoz ao Author,* as well as *Tratado em defensão da Carta de marear com o regimento da altura*, where Nunes also demonstrated a new way to calculate the distance to the pole

One of Nunes's masterpieces is *De Crepusculis Liber unus; Allacen Arabis vetustissimi Liber de Crepusculis*. In this work, he solved the problem of how to determine the day with the smallest twilight and also presented a more accurate method for measuring angles. At that time, to measure the altitudes of stars and planets, astronomers used the cross-staff, the quadrant, and the plane astrolabe, all of which lacked precision. In his work *De Regulis et Instrumentus*, Nunes described his invention thus:

> Due to the smallness of the device, it is not possible to subdivide its parts; therefore, it is not possible to estimate the portion of the height that should be added to the whole number of degrees. It would be convenient to describe, inside the device's surface area, 44 concentric circles, dividing the external quadrant into 90 equal parts, the closest in 89, the following in 88, and so on, always in the same sequence.

Later, Nunes's idea would be improved by Jacob Curtio and Clavius, but it was Pierre Vernier who made the practical workability of this solution to the problem of reading fractions of angles possible, and whose name is associated with it today.

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